

Principles of Numerical Analysis

By Alston S. Householder. (International Series in Pure and Applied Mathematics.) Pp. xi+274. (London: McGraw-Hill Publishing Company, Ltd., 1953.) 48s.

THIS book is not a manual on numerical computation but gives an account of the mathematical principles upon which numerical techniques covering a wide field may be based. It has been written on the assumption that the reader has access to a high-speed digital computer; but techniques for use on hand machines are also treated.

After an introductory chapter, mostly on the estimation of error, methods are described for solving systems of linear equations. The necessary matrix and determinant theory is developed *ab initio*, and is readable by the student who has gone only as far as the calculus in his mathematical training. Next, processes are described for solving non-linear equations. A thorough treatment of iterative methods is included. There is an important chapter on methods for calculating the latent roots and vectors of matrices, and for the inversion of matrices. Some new methods are described and compared with older techniques. The next two chapters deal with interpolation, and with more general methods of approximation. Then there is a chapter on numerical integration and differentiation, and finally a brief chapter—too brief, perhaps—on the Monte Carlo method.

There are some pleasing features about this book. Bibliographical notes appear at the end of each chapter, and the literature is well covered by the extensive bibliography at the end of the book. It is very easy for the reader to find a reference to more detail on any particular item of interest. The material is up to date (1952), and some recent developments have not been noted by the reviewer in any other book. Altogether, the author has been careful in the selection of material and in the method of presentation.

L. S. GODDARD

Physical Chemistry of Metals

By Dr. Lawrence S. Darken and Dr. Robert W. Gurry, with a Collection of Problems by Dr. Michael B. Bever. (Metallurgy and Metallurgical Engineering Series.) Pp. ix+535. (London: McGraw-Hill Publishing Company, Ltd., 1953.) 61s.

METALLOGRAPHY has been defined as the physical chemistry of the metallic state. In Britain, however, during the past fifteen years or so, attention has, in the main, been directed rather to the somewhat speculative physical aspects of the subject, though an outstanding exception is to be found in the work of Hume-Rothery and his pupils, of which generous acknowledgment is made in this book. In America, however, and by Masing in Germany, the physico-chemical aspects have remained a subject of continued study.

It is probably true that physical chemistry may be studied just as profitably in the melting furnace or heat-treatment plant as in laboratory glassware. Reaction kinetics and the theory of diffusion are examples of this. As metallurgy is being transformed from a craft to a science, although the craft is most emphatically still there, the physico-chemical bases of metallurgical processes, no less than those of metallography itself, are assuming greater and greater importance. It is therefore not without significance that both the authors of this book are connected with the United States Steel Cor-

poration, and the volume which they have produced is one of quite outstanding interest. It should, however, be made clear from the very start that this is no 'technical' treatise. It provides a thoroughly sound treatment of general physical chemistry on classical lines, but in which the various aspects of that science are studied and exemplified from metallurgical and metallographic examples. Although it is primarily intended for the more advanced student of metallurgy, this book might be used with advantage in the teaching in university schools of chemistry. It would, at any rate, introduce a sense of realism in its own branch of that subject which at times is somewhat lacking. The success or otherwise of such an experiment would be a matter of no little interest in the teaching of pure science.

As examples of the sort of treatment adopted, the nucleation of gas bubbles may be cited, which is exemplified by the frothing of the slag in the open-hearth furnace, or that of solid diffusion, where the processes of gas-carburization and welding are similarly employed. The iron-nitrogen and the iron-carbon systems are both considered in detail as examples of particular binary systems; but one of the most interesting chapters in the whole book is that on the liquid state, which might be read with as much profit by the chemist or the physicist. This is metallurgy as a legitimate branch of science in its own right.

F. C. THOMPSON

Plant Life in Malaya

By Prof. R. E. Holttum. Pp. viii+254. (London: Longmans, Green and Co., Ltd., 1954.) 18s. net.

PROF. R. E. HOLTUM, with some thirty-odd years of personal observations in one of the world's richest and most interesting floristic regions, has placed botanists, both in Malaya and elsewhere, in his debt by the production of this modest but fascinating volume. Into two hundred and fifty pages he has compressed an introductory account of a very complex and diverse subject—plant life in Malaya.

The aim of the book was to select judiciously from a vast amount of material, so that residents, teachers and first-year university students may be introduced on easy terms to some of the more common plants and their structure and mode of life, to species which illustrate growth-forms, the relationships of plants to their environment, floral structure, the biology of fruits and seeds, and so on. These are illustrated by line-drawings and by a wealth of what is evidently the author's personal observation. For the reviewer, at least, an attractive and interesting feature of the book is the author's demonstration of how well such common tropical plants as rubber, coconut, ginger, bamboo and yams, to mention only a few, can be used in teaching some of the elementary lessons in botany.

The curiosities of plant life, in which the region abounds—including saprophytes, parasites, aquatic plants, ant-plants, nest-ferns, climbing ferns, etc.—are also described and illustrated. In the final chapter, the author seizes on a theme that seldom fails to touch the imagination, namely, the tropical forest in all its extravagance and diversity, as a community of interdependent organisms. The effects of destroying extensive forest areas in the interests of agriculture are also expounded and discussed. This compact volume might well be used as part of the general reading of students of botany in British universities.

C. W. WARDLAW